NEVADA DIVISION OF ENVIRONMENTAL PROTECTION

F A C T S H E E T
(Pursuant to NAC 445A.236)
October 2003

PERMITTEE NAME: Kennametal, Incorporated

MAILING ADDRESS: 347 North Taylor Street
Fallon, Nevada 89406

PERMIT NUMBER: NEV92006

DISCHARGE LOCATION: Kennametal Incorporated (Nevada Refinery)
1077 Lovelock Highway (11 miles north of Fallon)
Fallon, Nevada 89406

Latitude: 29°37'30" North
Longitude: 118°47'30" West

Township 20 North, Range 28 East, Section 1 MDB&M

FLOW:

Outfall 001:	**Total Industrial Wastewater to Ponds: 80,000 gpd**
Outfall 001a:	Industrial Wastewater diverted for Dust Control: 35,000 gpd
Outfall 001b:	Industrial Wastewater from the Oil Water Separator to the Ponds: 4,000 gpd
Outfall 002:	**8,000 gpd Domestic Wastewater to Groundwater (Main Septic)**
Outfall 003:	**1,000 gpd Domestic Wastewater to Groundwater (Change House)**

GENERAL:

The Kennametal Nevada Refinery produces tungsten carbide (WC) crystals and tungsten carbide blends at a 622-acre site located approximately 11 miles north of Fallon on Highway 95. A kiln heated reaction called the thermit process is used for production, that when cooled, yields a crystal mass separated from waste slag. The facility operates on a schedule processing 11 thermits per month, equating to approximately 286 tons of ore. WC crystal mass is removed and crushed to 16 minus mesh size, and because it is virtually insoluble, undergoes acid leaching with either hydrochloric or sulfuric acid to remove residual impurities including iron, aluminum, and manganese.

Remaining insoluble impurities are removed by multi-gravity separation using Mozley Separator units that minimize water use by diverting spent leach liquor to a cyclone where the underflow is separated for acid reuse/recycling and the overflow is wasted for neutralization and metal precipitation. Wasted aqueous process flow is treated with slaked lime to neutralize the discharge and precipitate metal salts prior to discharge to one of 4 evaporation ponds, double lined with a 60 mil high density polyethylene (HDPE) liner overlying a 12-inch clay liner, and equipped with leak detection and dry sumps (Outfall 001). The effective evaporation area of the 4 ponds is 3.47 acres, with an estimated holding capacity of approximately 10 to 12 acre-feet given 2-feet of freeboard. Discharged water exhibits a pH of approximately 9 to 9.5 standard units (SU) and solids are expected to accumulate at a rate of 0.75 inches per year.

Metal salts and solids that precipitate and settle in the neutralization tank or subsequent clarifier are dewatered using a filter press to produce a non-hazardous lime filter cake. This lime cake (filter cake) and dewatered sludge periodically mucked from the clarifier or evaporation ponds is landfilled/stockpiled on site. Accumulation outside of containment was initially approved based on the "Interim Guidance – Beneficiation, Waste Disposal" policy

dated November 2, 1990, issued by the Bureau of Mining Regulation and Reclamation.[1] Under this guidance document, a Meteoric Water Mobility Procedure (MWMP) leachate threshold of 10 times the drinking water standard/s maximum contaminant level/s (MCL/s) was used to determine eligibility for stockpiling outside of containment. The landfill is currently permitted in accordance with a Class III Landfill Waiver (SWMI-02-99) issued by the Bureau of Waste Management.

To date, a volume of approximately 150,000 cubic yards of filter cake has been amassed in a square, unlined, 8-acre area to an average depth of 12 feet, and production operations generate approximately 100 tons of filter cake per month. Due to the volume and rate of filter cake generation, the waste is no longer considered '*incidental'* to the operation, and the Bureau of Waste Management has notified Kennametal in correspondence dated September 5, 2003 that a Class III Landfill permit must be obtained. Kennametal is currently in the process of applying for and obtaining a Class III Landfill permit from the Bureau of Waste Management.

Stabilized lime cake is a porous material containing a large amount of capillary moisture. Although damp when stockpiled, the material dries quickly, and in areas of high traffic and bermed slopes, creates a source of dust. As a modification to the existing permit, the proposed permit renewal authorizes the use of up to 35,000 gallons per day of treated wastewater as a palliative for dust control instead of discharge to the evaporation ponds. Because the application of treated wastewater for use as a palliative will be conditional and volume restricted to concur with the overall discharge flow to the evaporation ponds, this discharge will be referenced as a secondary discharge under Outfall 001, designated Outfall 001a.

Conditions limiting the use of treated wastewater to specified areas and prohibiting uncontrolled run-off or pooling of treated wastewater on or around the facility are specified in the proposed permit to manage contact with and deter percolation through native soil. The slightly alkaline condition of the treated wastewater will tend to fix or bind available metals rather than mobilize them, and the beneficial reuse of treated effluent to control dust improves site conditions, reduces fugitive emissions, and conserves resources.

Boiler blowdown is recycled to the scrubber system for use as make up water, and discharged through the neutralization treatment system to double-lined evaporation ponds. Non-contact, cooling water is diverted through an oil water separator (OWS) in the powder milling operation, which also discharges to the pond system. Even though this water is currently permitted for discharge through the sanitary leach field, Kennametal has redirected this flow to discharge with another 3,000 to 4,000 gallons of water per day generated from washing floors and equipment in the facility, which also discharges to the ponds through this OWS. Since this additional flow will be subject to specific limitations yet also contributes to the cumulative flow to the evaporation ponds (80,000 gpd), the OWS will be permitted as a secondary point of discharge to the evaporation ponds, designated Outfall 001b.

Wash water collected in a holding tank from an external concrete equipment wash pad will also be allowed to discharge to the ponds through the OWS (Outfall 001b) in the renewed permit. However, the Permittee must obtain Division approval for any mechanical or structural additions, amendments, or modifications necessary to divert this wash water through the OWS before implementation. Currently, collected wash water is pumped and transported for off-site disposal.

The discharge of domestic wastewater through leach fields after primary treatment through a main, 8,000-gallon septic system or a 1,000-gallon septic system serving an ancillary 'change house' are regulated in this permit as separate outfalls, Outfall 002 and Outfall 003, respectively. The discharge of any industrial process water through the septic system is not permitted, and continued monitoring for industrial compounds in domestic wastewater and at subsurface monitoring locations remains required.

Slag, separated from the tungsten carbide crystals during the thermit process, is generated at an estimated rate of approximately 88 tons per month (8 tons per thermit). The material is segregated and stockpiled on unlined

[1] Correspondence from NDEP to Kennametal, Inc. dated January 14, 1992

accumulation areas until shipped for recycling at a steel smelter. Documentation on file indicates that some leachate concentrations, particularly barium, can or do exceed a concentration 10 times the corresponding MCL. Since, the "Interim Guidance – Beneficiation, Waste Disposal" policy was superseded in January 1996 with the guidance document "Alternate Use of Mine Waste Solids – Disposal Outside of Containment," criteria for accumulation outside of containment no longer relies exclusively on established leachate thresholds, but requires unique proposals tailored to consider site-specific conditions. A technical evaluation of the characteristics of leachate from slag and an analysis of whether or not environmental characteristics abate potential impacts to groundwater is required as a function of the schedule of compliance.

RECEIVING WATER CHARACTERISTICS:

The site currently has four (4) monitoring wells that are regularly sampled to assess groundwater characteristics. Monitoring well MW-1 is in close proximity to the lined industrial wastewater evaporation ponds. Monitoring well MW-2 is located near the abandoned disposal site (unlined ponds and undefined 12-acre area of discharge; *reference Operations and Maintenance Manual*), and monitoring wells MW-3 and MW-4 are located near the main leach field.

The last well installed, monitoring well MW-4, was intended to be a replacement well for MW-3 because the placement of monitoring well MW-3 within approximately 40 feet of the leachfield produced biased monitoring results. In addition to the potential for hydraulic mounding to shift calculations for groundwater gradient and flow direction, the detection of elevated nitrogen concentrations in groundwater was inevitable. Therefore, in 1997, plans to monitor well MW-3 for only a limited amount of time pending the installation of a replacement well in 1998 were developed. Monitoring well MW-4 was installed in 1998 approximately 225 feet from the leachfield, and since that time, the effects of the leach field on groundwater have been assessed based on samples collected from that location. Continued monitoring at well location MW-3 was apparently sustained simply for purposes of interest and comparison.

Well construction specifications are summarized as follows:

MONITORING WELL CONSTRUCTION DETAILS

MONITORING WELL LOCATION	INSTALLATION DATE	CASING TYPE	TOTAL DEPTH (FEET)	SCREEN LENGTH (FEET)	APPROXIMATE DEPTH TO WATER (FEET BGS)
MW-1	February 1991	4" Steel	88	20	50
MW-2	February 1991	4" Steel	50	20	25
MW-3	November 1991	4" PVC	115	40	80
MW-4	September 1998	4" PVC	120	40	70

": Inch
PVC: Polyvinyl chloride
bgs: Below grade surface

As of November 2002, groundwater was observed at depths between 27 (MW-2) and 84 (MW-3) feet below grade surface (bgs), corresponding to a range of static elevations between approximately 3912 and 3922 feet above mean sea level. The difference in hydraulic head (mounding) between MW-3 and MW-4 is approximately 2 feet across a distance of approximately 220 feet. As of December 2002, the groundwater gradient and flow direction appears to be approximately 0.007 foot per foot moving in a north-northwesterly direction.

On-site test wells advanced as long ago as 1968 and extending to depths over 600 feet bgs profiled groundwater quality as non-potable, containing elevated concentrations of TDS, chlorides, sulfates, sodium, and iron. Groundwater pH measurements on file range from approximately 8 to 9.5 SU. Although these conditions tend to be typical of shallow groundwater in the Fallon area, there are no current monitoring well locations that can reliably confirm current background conditions in the shallow saturated zone.

Most municipal or domestic supply wells in Fallon extend for several hundred feet (500-600) bgs to access potable groundwater because of the generally poor groundwater quality, which is why early efforts to establish a potable water source at the Kennametal facility were unsuccessful. As a result, a 10-mile pipeline extending to a 'main well' in north Fallon is used to convey potable water to the site.

DISCHARGE CHARACTERISTICS:

Wastewater Discharge

The industrial discharge initially authorized under permit NEV92006 was, in effect, regulated as zero-discharge because process fluids were, and still are, required to be discharged to lined evaporation ponds. The only discharge to groundwater was from the leach fields for the main and change house septic systems (domestic wastewater), and while boiler blowdown and cooling water had been discharged to the leach fields, this practice is no longer permissible.

The proposed permit renewal maintains the industrial discharge to lined evaporation ponds, which now includes boiler blowdown and cooling water, as well as OWS effluent. The permit also authorizes the diversion of treated (neutralized) process water for use as a palliative on the filter cake heap. Therefore, what is effectively a zero-discharge condition for treated wastewater in the existing permit is proposed to be slightly modified to allow an alternative beneficial use of treated wastewater.

During the neutralization process, elevating the pH of the wastewater causes dissolved metals to complex into metal salts that settle into sludge (filter cake precursor), leaving only residual concentrations of dissolved metals in the aqueous fraction of the wastewater. The resultant discharge fluid, with a pH generally between 9.0 and 9.5 SU, predominantly exhibits elevated concentrations of chlorides (1200 milligram per liter, mg/L), calcium (1000 mg/L), sulfates (1300 mg/L), TDS (3800 mg/L), and nitrate as nitrogen (-N; 11 mg/L). Groundwater analysis of samples collected from the on-site supply well, dated 1969, indicate similarly elevated concentrations of chlorides (2720 mg/L), sodium (1840 mg/L), sulfates (340 mg/L), and TDS (5320 mg/L). Although it is clear that the neutralization process may increase salt concentrations (TDS), it is important to recognize that the quality of the intake water contributes to these elevated concentrations, and that those metal and ionic species identified in the effluent waste stream that are actually process-derived are present at only nominal concentrations.

The use of the treated and filtered wastewater as a dust suppressant at the facility is permissible because the chemical characteristics of the derived aqueous waste stream (inorganic ionic and complexed residual metals) are remnant of the characteristics of the filter cake, and therefore, land application poses no greater concern than the filter cake itself. Furthermore, since desiccated filter cake needs a palliative to control fugitive particulate dispersion, the use of the treated wastewater, which has an elevated pH, will tend to preserve complexed salts in the heap compared to a pH-neutral water source. Because the use of treated effluent as a palliative at the facility is governed by express limitations in the renewed permit that prohibit ponding and/or uncontrolled run off, ultimate disposal remains evaporation.

Discharge monitoring reports submitted under the renewed Groundwater Discharge Permit NEV92006 (October 1997) indicate consistent compliance with effluent limitations and monitoring requirements with the periodic exception of pH in samples collected from the main septic system. Data on file indicates that the discharge from the main septic system reflected pH measurements ranging up to approximately 10 standard units (SU), potentially explained as a ramification of the discharge of boiler blowdown water through the main septic system. The discharge of boiler blowdown and/or cooling water through the main septic system to groundwater is no longer practiced, and is instead directed to the evaporation ponds, which is required in the proposed permit renewal. Effluent from the main septic system reportedly ranges between 7.5 and 8.3 SU based on 3rd and 4th quarter 2002 discharge monitoring reports.

The main and change house septic systems both discharge to groundwater through independent leach fields located in the vicinity of each of the systems. Piezometers located immediately adjacent to the main leach field

indicate that the leach system continues to effectively operate as designed, and while groundwater nitrate concentrations at well location MW-3 are 10 mg/L, concentrations at the sentinel well location MW-4, approximately 225 feet north of well location MW-3, are less than detection limits. Considering the greater relevance of groundwater data associated with monitoring well location MW-4, abandonment of monitoring well MW-3 is now regarded as prudent to minimize surface communication with groundwater at unnecessary monitoring locations.

The OWS is used to intercept wash water and/or grinding oil spillage from the milling facility, which allows the discharge of water to the evaporation ponds while recovering the hydrocarbon compounds. Proper operation and maintenance of the OWS is a condition of permit compliance, and will be confirmed with a routine monitoring protocol incorporated into the proposed permit renewal. Equipment wash water from the wash pad may be discharged through the OWS, however, any facility modifications to connect the wash pad to the OWS must be approved by the Division before construction or implementation. If wash water is manually transported for discharge through the OWS, proper modifications to the Operations and Maintenance Manual must be completed and approved by the Division before implementation.

Solid Byproducts (leachate discharge)
MWMP test data generated under the initial permit NEV89029 (BMRR) indicated that barium could leach from slag at concentrations above primary drinking water standards. Although barium was the only analyte confirmed to leach in excess of drinking water standards, reporting limits (practical quantitation limits, PQLs) for antimony, beryllium, cadmium, lead, and thallium were/are greater than respective primary drinking water standards, effectively rendering any meaningful interpretation of this data inconclusive. Reported TDS concentrations and pH were in excess of secondary drinking water standards, and the reporting limit for manganese was above the secondary drinking water standard.

Analytical data for those analytes either identified to be in excess of drinking water standards or potentially in excess of drinking water standards (high PQLs) for the period 1990 through 1993 are summarized as follows:

SLAG LEACHATE DISCHARGE WATER QUALITY

	CONSTITUENTS UNDER PRIMARY DRINKING WATER STANDARDS						CONSTITUENTS UNDER SECONDARY DRINKING WATER STANDARDS		
Analyte ➤	**Barium**	**Antimony**	**Beryllium**	**Cadmium**	**Lead**	**Thallium**	**TDS**	**pH**	**Manganese**
MCL (mg/L) ➤	2	0.006	0.004	0.005	0.015	0.002	500	6.5-8.5	0.05
Monitoring Period▼									
3rd Qtr 1990	3.1	<0.5	<0.05	<0.15	<0.05	<2.5	1090.0	11.50	<0.5
4th Qtr 1990	3.6	<0.5	<0.05	<0.15	<0.05	<2.5	1140.0	11.74	<0.5
1st Qtr 1991	4.0	<0.5	<0.05	<0.15	<0.05	<2.5	1148.0	11.55	<0.5
2nd Qtr 1991	5.0	<0.5	<0.05	<0.15	<0.05	<2.5	1050.0	11.82	<0.5
3rd Qtr 1991	15.0	<0.5	<0.05	<0.15	<0.05	<2.5	1180.0	11.37	<0.5
4th Qtr 1992	34.0	<0.5	<0.05	<0.01	<0.05	<2.5	1150.0	11.57	<0.5
4th Qtr 1993*	67	<0.5	<0.1	<0.0002	<0.0010	<1	885	11.78	<0.1

[1] Secondary Standard
MCL: Maximum Contaminant Level
* MWMP tests were not required after 1993

The 1990 “Interim Guidance – Beneficiation Waste Disposal” document (attached) established guidelines for allowing waste ore to be stockpiled outside of containment based on a threshold MWMP leachate concentration

of 10 times the MCL, above which a "technical evaluation … [to] substantiate that the waste is stabilized and that it will not endanger human health or the public safety…." was required. In April 1992, this guidance document was used to support a determination that allowed solid byproducts to be collected and stored outside of containment.

There is documentation and supporting analytical data on file that asserts that "slag deposits are not a threat to surface or groundwater…[and] the slag may be used for base material for road or parking field construction"[2]. However, when increased concentrations of barium were observed in leachate in the 4th quarter 1992, the required "technical evaluation" was not initiated. By 1996, the 1990 interim guidance document was superseded with the revised version, "Alternative Use of Mine Waste Solids – Disposal Outside of Containment" (attached), which mandated site-specific technical proposals (assessments) as opposed to threshold concentrations as a basis for approval. Since the "technical evaluation" called for in the 1990 guidance document is conceptually consistent with the requirements of the 1996 version, a technical examination and presentation of conclusions to "substantiate" the stability of landfilled/stockpiled waste is required in the proposed permit renewal as a schedule of compliance item.

Test data profiling filter cake using the MWMP could not be located on file, and in 1994, the MWMP requirement for slag samples was replaced with a requirement to analyze both slag and filter cake using the toxic characteristic leaching procedure (TCLP), effectively eliminating further comparison of MWMP data to date. The examination of periodic TCLP data for slag and filter cake shifted the compliance criteria from drinking water standards to whether or not waste process materials may be characteristic of a hazardous waste. Concurrently, analyte parameters for monitoring wells MW-1 and MW-2 were modified to focus on only those analyte constituents predominantly and consistently identified in previous MWMP tests, i.e. pH, TDS, arsenic, barium, chromium, lead, and manganese.

Although historic MWMP test data for slag samples yielded particular analyte concentrations in excess, or potentially in excess, of drinking water standards, TCLP results consistently indicated that both slag and filter cake was (and is) non-hazardous per Resource Conservation and Recovery Act (RCRA) criteria. As a non-hazardous material, in 1998, Kennametal was issued a Class III Landfill Waiver from the Nevada Division of Environmental Protection, Bureau of Waste Management authorizing on-site landfill of filter cake in a designated 40-acre area, with a projected lifetime of 40 years.

TCLP data on file dating back to the early 1990s consistently confirms slag and filter cake to be non-hazardous materials, and therefore the non-hazardous characteristics of these materials are adequately substantiated for the purposes of protection of groundwater. Confirmation of waste characteristics using TCLP analyses may be continued, as necessary or appropriate, as a function of the Class III Landfill permit, which will replace the Class III Landfill Waiver and is the appropriate mechanism for long-term evaluation of solid waste chacteristics. Consequently, TCLP analyses of slag and filter cake have been omitted in the proposed permit renewal in favor of MWMP testing requirements that refocus compliance criteria on the characteristics of runoff or leachate from these materials and the possible ramifications to groundwater.

Other solid byproducts (e.g. carbon fines and bag-house dust) have been accumulated in drums and other random containers, many without secured lids, for storage with other scrap and miscellaneous equipment in a bone yard area. Recent site activities have, however, removed and reduced the volume of material stored and the number of open containers in storage. While this aspect of the operation appears to be improving, indefinite, open exposure of scrap and/or speculatively accumulated byproduct material is a condition that could cause adverse impact to groundwater. Fugitive dispersion from inclement weather conditions and/or deteriorating containers may spread metal-bearing products beyond reasonable control and potentially below grade surface. Consequently, unsecured waste and exposed byproduct material represents an opportunity for uncontrolled discharge that is addressed in the proposed permit renewal through the implementation of 'best management practices'.

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[2] First Quarter 1993 Discharge Monitoring Report, *A Brief Summary of Site Operations*, April 7, 1993.

PROPOSED LIMITATIONS:

Discharge of treated wastewater to the evaporation ponds and for use as a palliative on the filter cake heap and heavy traffic areas is controlled using narrative permit restrictions and monitoring requirements that mechanically manage application as to effect zero discharge to groundwater. It is the leachate runoff from solid byproducts and the percolation of domestic wastewater through leachfields that represent the discharges to groundwater otherwise limited and monitored under the terms of the permit. Recognizing that these discharges have the most potential to directly impact groundwater, proposed limitations preferentially focus compliance criteria on leachate characteristics and groundwater standards. While an element of compliance remains the verification of hazardous waste characteristics, leachate discharge limitations rely on drinking water standards or other water quality criteria as the basis for examination and future consideration regarding the sufficiency of the proposed permit limitations.

During the period beginning on the effective date of this permit and lasting until the permit expires, the Permittee is authorized to discharge from:

Outfall 001:	**The wastewater treatment system to the evaporation pond(s)**
Outfall 001a:	*For discharge to the evaporation ponds or alternative use as a palliative*
Outfall 001b:	*From the Oil Water Separator to the evaporation pond(s)*
Outfall 002:	**The main septic tank to groundwater of the State**
Outfall 003:	**The change house septic system to groundwater of the State**

Effluent samples and/or measurements taken in compliance with the monitoring requirements specified below shall be collected at:

Outfall 001:	**Prior to discharge into the evaporation pond(s); cumulative total**
Outfall 001a:	*At the discharge of the clarifier tank*
Outfall 001b:	*At the discharge of the Oil Water Separator*
Ponds 1-4:	*At a location corresponding to the total depth of the pond*
Main Water Well:	*At the discharge of the pump from the Main Water Well*
Leak Detection Sump 1:	*From the containment system*
Leak Detection Sump 2:	*From the containment system*
Outfall 002:	**At the discharge of the main septic tank prior to discharge to the leach field**
Outfall 003:	**At the discharge of the change house septic tank prior to discharge to the leach field**
Piezometers:	*At each piezometer location (1-4) near the main leachfield*

Discharge of Industrial Process Water

The discharge of industrial process water shall be limited and monitored as follows:

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Effluent Limitations: Industrial Discharges/Process Solutions

PARAMETERS	MONITORING LOCATIONS	DISCHARGE LIMITATIONS				MONITORING REQUIREMENTS	
		30-Day Average	Daily Maximum	Quarterly Average	Annual Average	Measurement Frequency	Sample Type
Discharge Flow Rate (gpd)	Outfall 001 (total)	80,000	Monitor & Report	-----	-----	Weekly	Calculation (staff gauge)
	Outfall 001a	-----	*35,000*	-----	-----	Continuous[1]	Calculation – Truck Cycle[2]
Pond Inspection	Ponds 1-4	At least 2 feet of freeboard				Weekly	Measurement
Liquid Accumulation (gpd)	Leak Detection Sump 1 & 2	-----	-----	<150	<50	Weekly	Inspection/ Measurement
pH	Outfall 001a & Outfall 001b	Monitor & Report	Monitor & Report			Weekly	Discrete
TPH (mg/L)	Outfall 001b		Monitor & Report			Quarterly	Discrete
NORM[3] Gross α (pCi/L)	Outfall 001	-----	15	-----	-----	Quarterly[4]	Discrete
NORM[3] Gross β (mrem/year)	Outfall 001	-----	4	-----	-----	Quarterly[4]	Discrete
NORM[3] Radium$^{226+228}$ (pCi/L)	Outfall 001	-----	5	-----	-----	Quarterly[4]	Discrete
NORM[3] Uranium (μg/L)	Outfall 001	-----	30	-----	-----	Quarterly[4]	Discrete
Tungsten[3] (total, mg/L)	Outfall 001	-----	Monitor & Report	-----	-----	Quarterly[4]	Discrete
Tungsten[3] (total, mg/Kg)	Slag & Filter Cake	-----	Monitor & Report	-----	-----	Quarterly[4]	Discrete
Molybdenum[3] (total, mg/L)	Outfall 001	-----	Monitor & Report	-----	-----	Quarterly[4]	Discrete
Molybdenum[3] (total, mg/Kg)	Slag & Filter Cake	-----	Monitor & Report	-----	-----	Quarterly[4]	Discrete
MWMP Profile II[3,5] (including W, Mo, gross α, gross β, Ra$^{226\&228}$, and U)[6]	Slag & Filter Cake	-----	Monitor & Report	-----	-----	Quarterly[4]	4-Point Composite
Profile II[7]	Outfall 001 & Main Well	-----	Monitor & Report	-----	-----	Annually[8]	Discrete

[1] Measurement recorded weekly.

[2] Cumulative accounting of the volume of treated water used as a palliative must be recorded based on the number of tank loads diverted multiplied by the volume of the tank.

[3] Parameters and/or monitoring frequencies may be removed or reduced, using the procedures for a minor modification at the discretion of the Division, based on a petition from the Permittee sufficiently demonstrating that the quality or characteristics of the parameters examined do not and will not affect groundwater.

[4] Quarterly for the first year (4 quarters), after which the frequency of analyses may be re-examined, and modified, reduced, or removed using the procedures for a minor modification, as appropriate.

[5] Leachate analyses using Profile II analyte list and tungsten, molybdenum, gross α, gross β, Radium$^{226+228}$, and uranium. Detection

limits must be at or below drinking water standards.

6 Any other gamma emitters known or suspected to be present must also be quantified and reported.

7 Analyte list Attached.

8 Analytical test shall be conducted in the 4th quarter.

gpd:	Gallons per day
mg/L:	Milligrams per liter
mg/Kg:	Milligrams per kilogram
pCi/L:	Picocuries per liter
mrem:	Millirem
MWMP:	Meteoric Water Mobility Procedure
W:	Tungsten
Mo:	Molybdenum
NORM:	Naturally Occurring Radioactive Materials
α:	Alpha
β:	Beta
Ra:	Radium
U:	Uranium
TPH:	Total Petroleum Hydrocarbons
<:	Less than

Flow: The cumulative industrial process discharge flow authorized under this permit is 80,000 gpd. This total flow rate is comprised of the flow from the wastewater treatment system and flow from the OWS. Flow from the wastewater treatment system can be either (1) discharged to the evaporation ponds or (2) diverted for use as a palliative on the filter cake heap. Discharge as a palliative is limited by a daily maximum discharge, however, a daily maximum flow to the ponds has not been established because the maximum discharge in any one day is not a concern as long as the ponds maintain at least 2-feet of freeboard at all times. The volume of water used as a palliative is to be recorded per truck load and reported as a daily discharge rate limited to 35,000 gallons per day.

Pond Inspections: Weekly recording of the freeboard in each of the ponds is required to gauge the total discharge (e.g. daily maximum) into each of the ponds. Although the proposed permit renewal also includes language regarding the requirement to maintain at least 2-feet of freeboard in each pond at all times, weekly pond inspections and recorded freeboard measurements are included as an effluent limitation to indirectly limit total discharge rates and assess pond integrity.

Liquid Accumulation: Weekly assessment of liquid accumulation beneath the evaporation pond liner is required to ensure the continuous operational integrity of the double-lined pond system(s). The conservative limitation of 150 gallons per day (gpd) as a quarterly average and 50 gpd as an annual average is derived from the Bureau of Mining Regulation and Reclamation guidance document *Permit Limitations for Leak Detection Systems*, dated December 23, 1991.

pH: Because the wastewater treatment process is a function of pH manipulation, the final pH of wastewater discharged, and particularly the pH of wastewater used as a palliative, is of interest as an indicator of treatment efficiency and possible residual constituent concentration. Although the Profile II suite of analyses includes testing pH, a more frequent record of this parameter can be used to infer the consistency of the treatment process and the efficacy of metal removal.

TPH: Analyses for total petroleum hydrocarbons on the wastewater discharged from the OWS to the evaporation ponds is required to ensure the proper function and maintenance of the OWS, and to confirm the absence of TPH mass in sufficient quantity to impair evaporative processes or cause a sheen.

Gross α,: Gross β, tungsten Radium, & Uranium

Raw ore material containing tungsten can also contain naturally-occurring radionuclides (naturally occurring radioactive material, NORM). These radionuclides can be concentrated by a refining process and may be found in waste products such as processed ore and slag. It is unknown whether raw ore materials received at the Kennametal facility contain(ed) concentrations of radionuclides sufficient to effect waste streams, and therefore, requirements to test for gross α, gross β, Radium, and Uranium, as well as other known or suspected gamma emitters, have been included in the renewed permit to assess these characteristics in the aqueous discharge and byproducts.

The specific effluent discharge limitations listed are based on primary drinking water standards; however, discharge limitations are subject to modification or removal, as a minor modification, based on a review of data compiled during the term of this permit. Additional limitations may be amended to the permit, depending on whether or not additional gamma emitters are identified in future compliance analyses. Total average discharge of Uranium is calculated to be 0.01 pound per day.

Tungsten: The prevalence of tungsten and tungsten-bearing materials on-site warrants the examination of fugitive concentrations of this metal in the effluent waste stream, as well as by-product materials (slag and filter cake) stock-piled outside of containment.

Molybdenum: Molybdenum is often found in tungsten rich deposits since both metals develop in high temperature geologic environments. While tungsten is the target metal for processing at the Kennametal facility, the potential presence and prevalence of molybdenum in the raw ore materials warrants further analytical assessment.

MWMP: Because slag MWMP test results indicated barium and possibly other constituent concentrations in excess of drinking water standards, quarterly analysis using the MWMP/Profile II is required to clearly define the profile of analytes that may have the propensity to leach from byproduct materials. In addition, tungsten, molybdenum, gross α, gross β, Radium, and Uranium have been added to the list of analytes because of the prevalence of tungsten on site, and the association of the other characteristics with raw ore from high-temperature geologic formations.

Similar testing requirements have been included in the proposed permit renewal for filter cake in order to evaluate the stability of metal compounds in the heap and to confirm the characteristics of aqueous leachate. An evaluative report incorporating MWMP test data, as well as other relevant data or information, is required as a schedule of compliance item in the proposed permit renewal to assess the potential for uncontained and uncovered slag and filter cake constituents to impact groundwater.

MWMP test samples are specified to be 4-Point Composite samples, which means that discrete samples of each material (filter cake and slag) are to be collected at four (4) times, at equal time intervals, during the monitored period, in this case a calendar quarter. These discrete samples are to be composited into a single sample for analysis to collectively represent the characteristics of each waste stream discharged during the reported interval.

Profile II: An inorganic profile of the effluent waste stream is required on an annual basis to confirm that discharge characteristics remain consistent over time. Mass discharge using 4th quarter 2002 Profile II data at 35,000 gpd is estimated to be 2,262 pounds per day (#/day). The current requirement to annually analyze process supply water from the main well using a Profile I suite of analyses has been modified to require a Profile II suite of analyses in the proposed renewal to confirm and directly compare ambient water quality relative to the altered characteristics of treated process water. Profile II analytical results on liquid samples such as the effluent waste

stream, reported in units of mass per volume, renders data that is effectively equivalent to the TCLP.

Septic Systems – Outfall 002 and Outfall 003

Septic discharge shall be limited to sanitary wastewater. The discharge of domestic septage shall be limited and monitored as follows:

Effluent Limitations: Outfall 002 and Outfall 003 – Septic Systems

PARAMETERS	MONITORING LOCATION	DISCHARGE LIMITATIONS			MONITORING REQUIREMENTS	
		30-Day Average	Daily Maximum	Annual Average	Measurement Frequency	Sample Type
Discharge Flow Rate (gpd)	Outfall 002	8,000	-----	-----	Monthly	Pump Timer
	Outfall 003	1,000	-----	-----	Monthly	Pump Timer
Effluent Depth (inches)	Piezometers 1-4 (Outfall 002)	-----	Monitor & Report		Monthly	Measurement
pH (SU)	Outfall 002 Outfall 003	6.5-9.0	6.5-9.0	-----	Monthly	Discrete
Tungsten[1] (total, mg/L)	Outfall 002 Outfall 003	-----	Monitor & Report	-----	Quarterly	Discrete
Molybdenum[1] (total, mg/L)	Outfall 002 Outfall 003	-----	Monitor & Report	-----	Quarterly	Discrete
Total Nitrogen as N (mg/L)	Outfall 002 Outfall 003	-----	Monitor & Report	-----	Quarterly	Discrete
Profile II[2] (various)	Outfall 002 Outfall 003	-----	Monitor & Report[3]	-----	Annually[4]	Discrete

1 Parameters and/or monitoring frequencies may be removed or reduced, as a minor modification at the discretion of the Division, based on a petition from the Permittee sufficiently demonstrating that the quality or characteristics of the parameters examined do not and will not affect groundwater.

2 Analyte list Attached

3 Detection limits must be at or below drinking water standards for relevant analytes.

4 Analytical test shall be conducted in the 4th quarter.

gpd: Gallons per day
mg/L: Milligrams per liter
SU: Standard Units

Flow Rate & Effluent Depth: These limitations and monitoring requirements (effluent depth) are included to ensure that operation conforms to system design specifications and that the leach field is performing adequately to accommodate the design flow.

pH: A pH limitation has been included to substantiate the absence of discharges other than domestic sanitary wastes and to confirm the relative neutrality of discharges since treated wastewaters typically exhibit pH in excess of 9.0 SUs.

Tungsten: The prevalence of tungsten and tungsten-bearing materials at the facility warrants routine analyses for this analyte.

Molybdenum: Molybdenum is often observed in ore bodies that are rich in tungsten because both metals are formed under high-temperature geologic conditions. Therefore, due to the potential prevalence of this metal in materials on-site, routine analysis for this analyte is also required.

Total Nitrogen as N: Total nitrogen analyses are required to monitor potential nitrogen loading to soil and groundwater and to correlate calculated mass loading to the capacity of the underlying aquifer to attenuate discharged concentrations.

Profile II: An annual analyses for Profile II analytes required to confirm that process fluids are not discharged in measurable or detectable quantity. The existing permit required a Profile I suite of analytes, however, the Profile II suite of analytes has been instituted for the sake of consistency between and direct comparison of the constituents quantified in the effluent and main water well.

Removed Parameters: Monitoring requirements for iron, manganese, copper, fluoride, silica, and color in the main septic system discharge have been removed since these analytical requirements were established to evaluate and profile the discharge of boiler blowdown and cooling water through the main septic system. The current proposed permit renewal does not authorize discharge of boiler blowdown, cooling water, nor is wash water from laundering facilities permitted through the septic system, and therefore, continued analyses for these analytes in the septic discharge is not warranted.

Ground Water Monitoring

The proposed permit renewal requires monitoring well MW-3 to be abandoned because: (1) samples are a poor representation of aquifer conditions because of placement too close to the leach field, (2) groundwater data associated with monitoring well MW-3 is less representative than data collected at monitoring well MW-4, and (3) it is an unnecessary surface to aquifer conduit. However, groundwater monitoring at only the remaining wells MW-1, MW-2, and MW-4 is insufficient to adequately characterize and confirm aquifer conditions across the facility. Given the interpretation of groundwater gradient and flow direction toward the north-northwest, most of the monitoring wells are configured up gradient of the actual refining operations. In addition, monitoring wells have not been placed in locations to confirm the absence of groundwater impacts from stockpiled slag and filter cake.

Even though shallow groundwater in the Fallon area is generally poor and non-potable, further degradation because of operational practices must be avoided. It is, therefore, necessary to establish a monitoring point at an up gradient, unimpacted, background location (MW-5), in addition to the installation of monitoring wells to the north-northwest of the slag pile, the filter cake heap, and the bone yard (MW-6 through MW-8) to assess net impact of operations on groundwater.

Design plans and specifications to install any well(s) at the facility must be submitted to the Division for review and approval prior to the execution of any construction activities, and the abandonment of any well material to the permit must be approved by the Division prior to demolition. Copies of relevant permits obtained for drilling or abandonment must also be submitted to the Division with proposed plans. As-built drawings and coordinate references to location and elevation must be provided after completion of construction activities.

Groundwater monitoring activities shall be conducted in accordance with proper sampling and analysis protocols that, at a minimum, ensure the collection of representative aquifer samples using sterile sampling technique. Monitoring wells MW-1, MW-2, and MW-4, as well as, all additional monitoring wells installed at the site, shall be measured and sampled according to the following parameters:

GROUNDWATER MONITORING REQUIREMENTS

PARAMETERS[1]	GROUNDWATER LIMITATIONS	SAMPLING LOCATIONS[2]	MONITORING REQUIREMENTS	
			Measurement Frequency[1]	Sample Type
Depth to Water (feet)	Monitor & Report	Each well	Quarterly	Measurement
Groundwater Elevation (amsl)	Monitor & Report	Each well	Quarterly	Calculation
pH (SU)	Monitor & Report	Each well	Quarterly	Discrete
Antimony (mg/L)	Monitor & Report	Each well	Quarterly	Discrete
Barium (mg/L)	Monitor & Report	Each well	Quarterly	Discrete
Beryllium (mg/L)	Monitor & Report	Each well	Quarterly	Discrete
Cadmium (mg/L)	Monitor & Report	Each well	Quarterly	Discrete
Lead (mg/L)	Monitor & Report	Each well	Quarterly	Discrete
Manganese (mg/L)	Monitor & Report	Each well	Quarterly	Discrete
Molybdenum (mg/L)	Monitor & Report	Each well	Quarterly	Discrete
Tungsten (mg/L)	Monitor & Report	Each well	Quarterly	Discrete
Total Dissolved Solids (mg/L)	Monitor & Report	Each well	Quarterly	Discrete
Sulfates (mg/L)	Monitor & Report	Each well	Quarterly	Discrete
Chloride (mg/L)	Monitor & Report	Each well	Quarterly	Discrete
Total Nitrogen as N (mg/L)	Monitor & Report	MW-4	Quarterly	Discrete
Nitrate as N (mg/L)	7.0/10.0[3]	MW-4	Quarterly	Discrete

amsl: feet above mean sea level (above)
SU: Standard Units
mg/L: milligram per liter
as N: as Nitrogen

[1]: Parameters and/or monitoring frequencies may be removed or reduced, as a minor modification at the discretion of the Division, based on a petition from the Permittee sufficiently demonstrating that the quality or characteristics of the parameters examined do not and will not affect groundwater.

[2]: Groundwater monitoring wells MW-1 through MW-8, until MW-3 is abandoned, at which time, groundwater monitoring shall be performed at monitoring well locations: MW-1, MW-2, MW-4, MW-5, MW-6, MW-7, and MW-8.

[3]: Per the schedule of interim measures required under Part I.A.2.e.

Depth to Water/ Groundwater Elevation: This monitoring requirement is included to compile the relevant information necessary to determine groundwater gradient and flow direction.

pH & Metals: Monitoring for pH and the list of metals included is required to assess potential impacts to groundwater from the refining process. These metals have historically been the primary analytes identified or quantified in samples of slag or filter cake. In addition, analyses for tungsten and molybdenum have been added because of the known or expected presence of these metals in solid byproducts and/or discharged solutions. Analyses for these constituents at monitoring well location MW-4 has been preserved to confirm the absence of industrial discharges through the

main leachfield.

Nitrogen, TDS & Salts: Total nitrogen and nitrate monitoring are required at well location MW-4 to confirm the absence of elevated nitrogen loading from the leach field. The effluent limitation of '7/10' mg/L has been included to indicate that if groundwater concentrations at MW-4 yield 7 mg/L of nitrate, remedial response must be initiated, but if groundwater exhibits a concentration of 10 mg/L, the discharge must cease per narrative conditions in the proposed permit renewal. Analyses for TDS, sulfates, and chlorides are required for assessment of groundwater impact from the leach field system, as well as, potential impacts from industrial discharges across the site.

SCHEDULE OF COMPLIANCE:

The Permittee shall implement and comply with the provisions of the permit upon issuance and the following schedule of compliance, after approval by the Administrator, including in said implementation and compliance, any additions or modifications the Administrator may make in approving the schedule of compliance.

- **Upon issuance of the permit,** the Permittee shall achieve compliance with all discharge limitations;

- **Within 120 days of the permit issuance date (date),** the Permittee shall submit a design and installation plan to the Division for the construction of at least four (4) additional groundwater monitoring wells. Additional monitoring wells (tentatively MW-5 through MW-8) shall be installed at locations up gradient of the facility (background) and to the north-northwest of the slag pile, the filter cake heap, and the bone yard. Each well shall be constructed with a screened interval that intercepts the phreatic surface of groundwater and extends to a depth sufficient to monitor groundwater throughout seasonal fluctuations, in accordance with "WTS-4: Monitoring Well Design Requirements" (NDEP, February 1997). Specifications for abandonment of monitoring well MW-3 must also be detailed.

  The plan must include well construction specifications, a proposed installation and well development schedule, and a facility map illustrating the proposed well locations. Well designs must be in accordance with *WTS-4: Monitoring Well Design Requirements (NDEP, February 1997).* A professional engineer licensed in the State of Nevada must stamp all plan designs and proposal specifications submitted to the Division for review and approval. The well design and installation plan must be approved by the Division before implementation. All well installations and abandonments must be properly permitted in accordance with Division of Water Resource requirements prior to execution.

  Within 45 days of well installation activities, the Permittee shall submit a Completion Report detailing field observations, as-built construction specifications, and boring logs labeled with identification designations. The Completion Report must also include copies of all well installation permits and notices of intent to abandon, and a map illustrating surveyed well locations and top-of-casing elevations

- **Within 120 days of the permit issuance date (date),** the Permittee shall submit an updated Operations and Maintenance (O&M) manual that, at a minimum, also includes:

  (1) a detailed description of the sampling and analysis protocols, procedures, and methods used for groundwater monitoring;
  (2) a process flow diagram for the wastewater treatment and sludge processing system;
  (3) specifications and/or maps illustrating the dimensional characteristics and capacity of the evaporation pond system;
  (4) solid waste handling, storage, and/or recycling practices; and
  (5) best management practices (BMPs) to reduce or eliminate uncontrolled dispersion of byproduct materials.

- **Within 180 days of the permit issuance date (date),** the Permittee shall submit a Technical Evaluation that examines the characteristics of leachate from slag and filter cake and any potential impacts that may result from uncontrolled percolation to groundwater. At a minimum, the technical evaluation must include an assessment of new (current) MWMP test data for samples of slag and filter cake and of groundwater data collected from new and existing well locations. The prevalence of exposed, solid byproduct materials in the bone yard, whether or not speculatively recyclable, shall also be addressed in the technical evaluation because open containers and dilapidated drums effectively constitute storage outside of containment for these materials as well.

PROPOSED DETERMINATION:

The Division has made the tentative determination to issue (renew) the proposed permit, under the provisions prescribed, for a 5-year period. This project falls under the fee category *Discharge from Remediation, Dewatering, other than a discharge to groundwater from the dewatering of a mine, or from a Power Plant, a Manufacturing or Food Processing Facility or any Other Commercial or Industrial Facility - 50,000 gallons or more but less than 250,000 gallons of process water daily*.

PROCEDURES FOR PUBLIC COMMENT:

Notice of the Division's intent to issue a permit authorizing the facility to discharge to ground water of the State of Nevada, subject to the conditions contained within the permit, is being sent to the **Lahontan Valley News and the Reno Gazette Journal** for publication. Notice is also mailed to interested persons on our mailing list. Anyone wishing to comment on the proposed permit can do so in writing for a period of 30 days following the date of the public notice, and must be postmarked, faxed, or E-mailed by 5:00 p.m. on **TBD XX XX, 2003**. The comment period can be extended at the discretion of the Administrator. A public hearing on the proposed determination can be requested by the Applicant, any affected state, any affected interstate agency, the Regional Administrator, or any interested agency, person, or group of persons. The request must be filed within the comment period and must indicate the interest of the person filing the request and the reason(s) why a hearing is warranted.

Any public hearing held by the Administrator will be conducted in the geographical area of the proposed discharge or any other area the Administrator determines to be appropriate. All public hearings will be conducted in accordance with NAC 445A.238. The final determination of the Administrator may be appealed to the State Environmental Commission pursuant to NRS 445A.605.

Prepared by: Tamara J. Pelham
October 6, 2003
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